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Steve LEE et al.

Application No.: 10/668,220

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For: METHOD FOR PREVENTING READ
ERRORS IN OPTICAL DISC DRIVE

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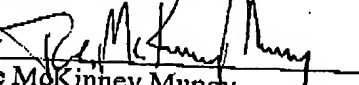
Sir:

Enclosed please find a verified English translation of Taiwan priority document No. 091121854 filed on September 24, 2002, for which the Applicant hereby perfects the claim for priority under Rule 55(a).

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: February 27, 2007

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CERTIFICATE OF TRANSLATION

I, Ti-Kuo LIU, of TOP TEAM INTERNATIONAL PATENT & TRADEMARK OFFICE located at 3rd Fl., No. 279, Sec. 4, Hsin-Yi Rd., Taipei, Taiwan, R.O.C, hereby declare that I am the translator of the attached Taiwan priority document no. 91121854, filed on September 24, 2002, and certify that the following is a true translation of the document to the best of my knowledge and belief.

Signature of Translator Ti-Kuo Liu
Ti-Kuo LIU

Dated this 8th day of February, 2007

Enclosure: translation of Taiwan priority document no. 91121854.

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application No. 91121854

TITLE**METHOD FOR PREVENTING READ ERRORS IN OPTICAL DISC DRIVE****ABSTRACT**

A method for preventing data reading error, the method
5 comprising: determining a read mode; if the read mode is an
audio/video play mode, executing a first read procedure to
read the data on the disk; if the read mode is a read mode,
executing a second read procedure to read the data on the
disk; and outputting the data.

10

DISCRIPTION OF THE INVENTION

The invention relates to a method for preventing data
reading error in an optical disc drive, and particularly to
a method for preventing audio disc reading error, having a
two read procedures to prevent display segmentation and
15 prevent disc burn failure from data reading error and buffer
data shortage.

In digital technology age, quality of data process and
storage of computer is increased. Although hard disc
producers improve quality, capacity, speed, reliability of
20 hard disc, user suffers expense when not copy or reserve
important data in time. Not only suffering data lost,
manpower, time and cost are required to rebuild the data.
To solve this predicament, compact disc (CD), CD-ROM drive
and CD burner has had significant advance in the evolution
25 of data storage. With the development of optical storage
media, data can be recorded and backed up into optical disks
with high capacity, small volume, light weight, easy to

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carry, easy to write and high reliability, which has been replacing hard disc to store important data. Furthermore, the optical storage media has superior quality for audio and video data, which is a milestone in audio and video
5 technology.

Fig. 1 shows a block diagram of a disc servo system in an optical disc drive as an example. An optical head 11 reads reflected signals from an optical disc 10. Being amplified and processed by the RF (Radio Frequency) IC 12, the FE (Focus Error) signal, TE (Track Error) signal and relative data and signals as read are input to DSP (Digital
10 Signal Processor) and microprocessor 13. After analyzing the received signals, the microprocessor 13 accordingly generates and outputs signals to corresponding servos
15 (Focusing Servo 14, Tracking Servo 15 and Spindle Motor Servo 16) to control the actuators (focusing actuator 17 and tracking actuator 18), sled motor 19 and spindle motor 20 and to ensure data accuracy during reading or writing.

Damaged tracks on the optical disc and defocus of the
20 laser beam from the optical head 11 occur while read data on the optical disk. These events cause readout data from the optical disk as inaccurate or unacceptable. Thus, there is a need to prevent data reading error.

Traditionally, the method for preventing data reading
25 error, as reading video track, comprises the following steps shown in Fig. 2. First, in an initial mode, the optical disc drive reads data from an optical disc (step S1). When the data cannot be read (or is unacceptable as read) and a buffer for temporarily storing readout data stores a
30 sufficient amount of data for output (step S2), the data is

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reread (step S1). When the data is read correctly (in other words, acceptable) or the buffer has an insufficient amount of data for output, the data is compulsorily written into the buffer (step S3). Eventually, the data is output (step
5 S4) from the buffer.

Generally, if the optical disc drive is in a read mode, there is no time constrain. Nevertheless, when the optical disc drive is in an audio/video play mode (playing an audio/video program from an optical disk), time constrain
10 must be considered. The reason is that audio/video play must be continuous without break, which provides user smooth enjoyment quality. Good audio/video play quality requires two requirements: first, data reading accuracy and data play accuracy to provide accurate audio/video play, and second,
15 smooth play with no break. However, when conventional optical disc drive reading audio/video disc, for satisfying the first requirement, more time is wasted to read data accurately, and break occurs in music play.

The invention provides a method for preventing data
20 reading error, comprising the following steps: determining a read mode; if the read mode is an audio/video play mode, executing a first read procedure to read the data on the disk; if the read mode is a read mode, executing a second read procedure to read the data on the disk; and outputting
25 the data.

The first read procedure comprises the following steps: reading and determining a data; when the data is read correctly, the data is outputted to play; when the data is read incorrectly and the buffer has buffer data for output,
30 the data is reread; re-determining the data in the reread

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process; when the data is read correctly, the data is
outputted to play; when the data is incorrect, the reread
steps lower a predetermined limit, and the buffer has buffer
data for output, the first read procedure is performed again
5 to reread the data; when the reread steps over a
predetermined limit, the data is output to play; when the
buffer has insufficient buffer data for output, the data is
output to play to prevent sound break.

As well, the second read procedure comprises the
10 following steps: when the data is read correctly in first
read, the data is outputted to be copied; when the data is
read incorrectly, the data is reread; re-determining the
data in the reread process; when the data is read correctly,
the data is outputted to be copied; when the data is
15 incorrect, the reread steps lower a predetermined limit,
the data is reread again; when the reread steps over a
predetermined limit, the data is output to be copied.

In the invention, the read process of the music disc is
defined in two modes. First, audio/video play mode, for
20 example, in playing music or movie, the invention prevents
audio output interruption. As a result, when data read
error happens, it is important to ensure that the buffer has
sufficient data for output during the data reread step. When
the buffer has insufficient buffer data for output, the data
25 read incorrectly must be driven to output. Although data
read errors negatively affect tone quality, it is preferable
and unobvious to interruptions in output.

Second, in copy mode, for example, when copy data from
a disc storing music or movie, since the data is
30 successively stored on the disc, the copy mode of the

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optical disc drive similar must be continuous and
uninterrupted. If only one link breaks down, the writing
process fails, thus the recordable disc has to be discarded.
Furthermore, by contrast between audio/video play mode and
5 the copy mode, the optical disc drive can use a slower
rotation speed to read the data from the disc and to write
into the buffer in copy mode. Therefore, during the reread
step of copy mode, the optical disc drive not only has more
buffer data in the buffer for output but also reduces the
10 rotation speed to reread data.

According to the invention, the method for preventing
read errors in an optical disc drive sets particular read
process based on different data read modes to reduce data
read errors, to assist smooth audio output, and copy data
15 accurately.

A detailed description is given in the following
embodiments with reference to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

- Fig. 1 is a block diagram of a disc servo system;
20 Fig. 2 is a flow diagram of a conventional read
procedure of an optical disc drive;
Fig. 3 is a flow diagram of an embodiment of the
present invention; and
Fig. 4 is a flow diagram of another embodiment of the
25 present invention.

SYMBOLS

10-disc

12-RF IC

11-optical head

30 13-microprocessor

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14~focusing servo	5 18~tracking actuator
15~tracking servo	19~sled motor
16~spindle motor servo	20~spindle motor
17~focusing actuator	

EMBODIMENTS

A disc in the embodiments of this invention is a music
10 CD or a video CD as an example. The data in a music CD or a
video CD lacks error correction to cause difficulty during
data retrieving, and generates more reading error. Somehow,
the minor reading error can be accepted without received by
user as sound break, mosaic image or stopped image. Of
15 course, no error in the data flow would be better.
Nevertheless, during coping files, the optical disc drive is
allowed to have more time for reading correct data from the
CD. This more time for reading can be achieved by reducing
the rotation speed of the music/video CD.

20 Fig. 3 is a flowchart shows an embodiment of the
present invention for preventing reading error. From a
start mode (step START), a disc is inserted in the optical
disc drive and a read mode is decided. First, read mode of
the optical disc drive is determined if it is an audio/video
25 play mode (step S11). If the optical disc drive is in an
audio/video play mode, the following steps are performed:
reading the data from the disc (step S12); recognizing that
the data as read is unacceptable and stored data in the
buffer is more than requirement (step S13); rereading the
30 data from the disc (step S12); otherwise, the data is
compulsorily written into the buffer (S14) and output
therefrom (S15).

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As well, if the read mode is not an audio/video play mode (step S11), determined if it is a copy mode (step S16). If the optical disc drive is in the copy mode, the following steps are performed: reading the data from the disc (step S17); recognizing if the data as read is unacceptable and stored data in the buffer is more than requirement (step S18), reducing the rotation speed of the optical disc drive (S19); rereading the data from the disc (step S17); otherwise, the data is compulsorily written into the buffer (S14) and output therefrom (S15).

The audio/video play mode and the copy mode differ in that a copy speed of CD burner is much lower than a reading speed of optical disc drive; thus a bigger buffer is acceptable, that is in copy mode, the optical disc drive allows more reread steps to read data from the optical disc correctly. However, in audio/video play mode, the optical disc drive reads disc in a fixed speed, the buffer in audio/video play mode is smaller than that in copy mode to prevent sound break, reread steps are reduced, and read speed of the optical disc drive is not decreased.

In the embodiment described above, one of the critical conditions for rereading the data is where the buffer has sufficient data. The number of reread steps can also be used to determine whether the data is reread, wherein the number of reread steps in audio/video play mode is lower than that in copy mode.

Another embodiment of the invention is described herein, as shown in Fig. 4, which is a flowchart thereof. From a start mode (step START), a disc is inserted in the optical disc drive and a read mode is decided. First, read

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mode of the optical disc drive is determined if it is an
audio/video play mode (step S21). If the optical disc drive
is in an audio/video play mode, the following steps are
performed: reading the audio/video data from the disc (step
5 S22); recognizing that the data as read is unacceptable and
the number of reread steps is less than a predetermined
limit (step S23); rereading the data from the disc (step
S22); otherwise, the data is compulsorily written into the
buffer (S24) and output therefrom (S25).

10 As well, if the read mode is not an audio/video play
mode (step S21), determined if it is a copy mode (step S26).
If the optical disc drive is in the copy mode, the following
steps are performed: reading the data from the disc (step
S27); recognizing that the data as read is unacceptable and
15 the number of reread steps is less than a predetermined
limit (step S28), reducing the rotation speed of the optical
disc drive (S29); rereading the data from the disc (step
S27), wherein in copy mode, higher predetermined limit is
allowable, thus, the predetermined limit in copy mode is
20 much higher than that in audio/video play mode; otherwise,
if the data is correctly read or the reread steps reaches
the predetermined limit, the data is compulsorily written
into the buffer (S24) and output therefrom (S25).

In the second embodiment, reread step limit is added as
25 critical conditions for rereading the data to prevent
transmission break.

While the invention has been described by way of
example and in terms of the preferred embodiments, it is to
be understood that the invention is not limited to the
30 disclosed embodiments. To the contrary, it is intended to

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cover various modifications and similar arrangements (as
would be apparent to those skilled in the art). Therefore,
the scope of the appended claims should be accorded the
broadest interpretation so as to encompass all such
5 modifications and similar arrangements.

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What is claimed is:

1. A method for preventing data reading error, the method comprising:

determining a read mode;

5 if the read mode is an audio/video play mode, executing a first read procedure to read the data on the disk;

if the read mode is a read mode, executing a second read procedure to read the data on the disk; and
10 outputting the data.

2. The method as claimed in claim 1, wherein the first read procedure comprises:

reading the data from the disc;

writing the data into a buffer; and

15 outputting the data from the buffer.

3. The method as claimed in claim 2, wherein, the first read procedure further comprises:

20 rereading the data from the disc when the data as read is recognized as unacceptable and stored data in the buffer is more than requirement; when the data is read correctly or the buffer has an insufficient amount of data for output, the data is compulsorily written into the buffer and output therefrom to be play.

25 4. The method as claimed in claim 2, wherein, the first read procedure further comprises:

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5 rereading the data from the disc when the data as read
is recognized as unacceptable and stored data in
the buffer is more than requirement; when the
data is read correctly or a reread steps over a
predetermined limit, the data output to be play
to prevent play break.

5. The method as claimed in claim 1, wherein the
second read procedure comprises:

10 reading the data from the disc;
writing the data into a buffer; and
outputting the data from the buffer.

6. The method as claimed in claim 5, wherein, the
second read procedure further comprises:

15 rereading the data from the disc when the data as read
is recognized as unacceptable and stored data in
the buffer is more than requirement; when the
data is read correctly or the buffer has an
insufficient amount of data for output, the data
is compulsorily written into the buffer and
20 output therefrom to be copy.

7. The method as claimed in claim 5, wherein, the
second read procedure further comprises:

25 rereading the data from the disc when the data as read
is recognized as unacceptable and stored data in
the buffer is more than requirement; when the
data is read correctly or a reread steps over a
predetermined limit, the data output to be copy
to prevent copy break.

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8. The method as claimed in claim 6 or 7, wherein the second read procedure further comprises a step of reducing a rotation speed of the disc before the step of rereading the data on the disc.

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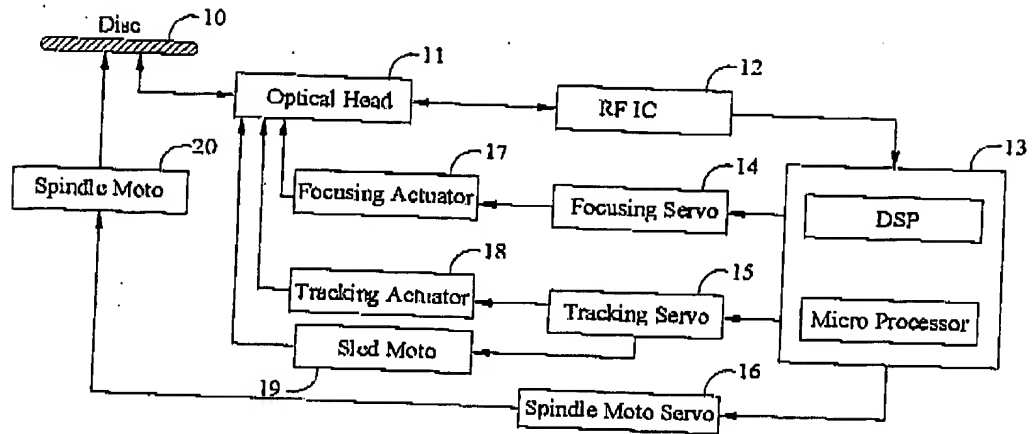
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FIG. 1 (PRIOR ART)

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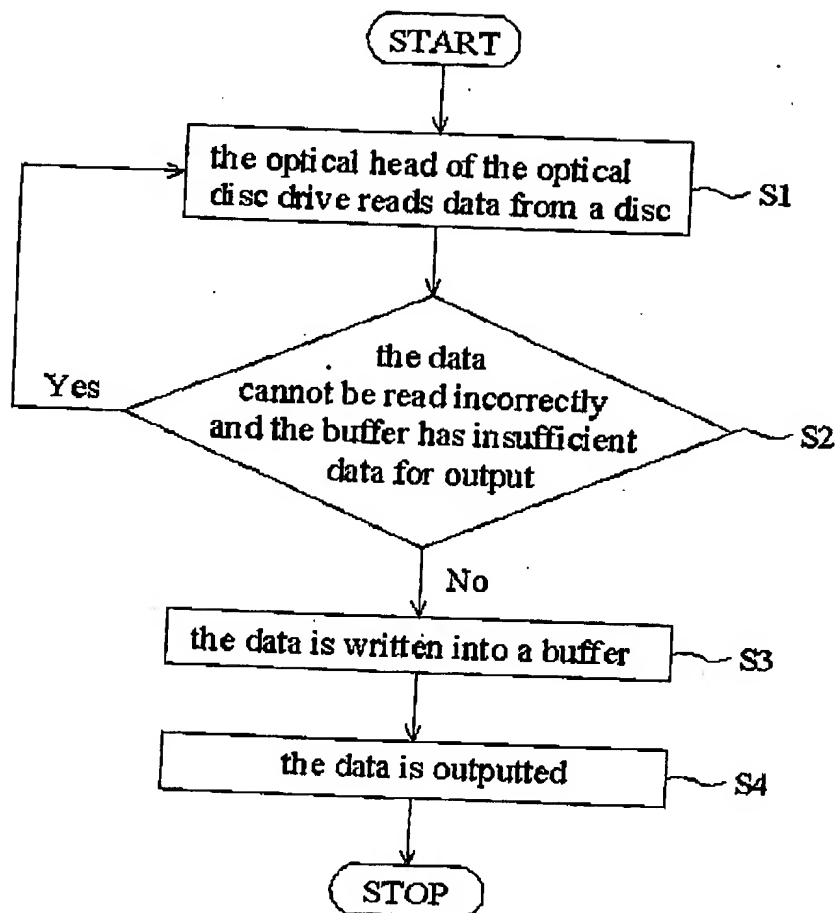


FIG. 2 (PRIOR ART)

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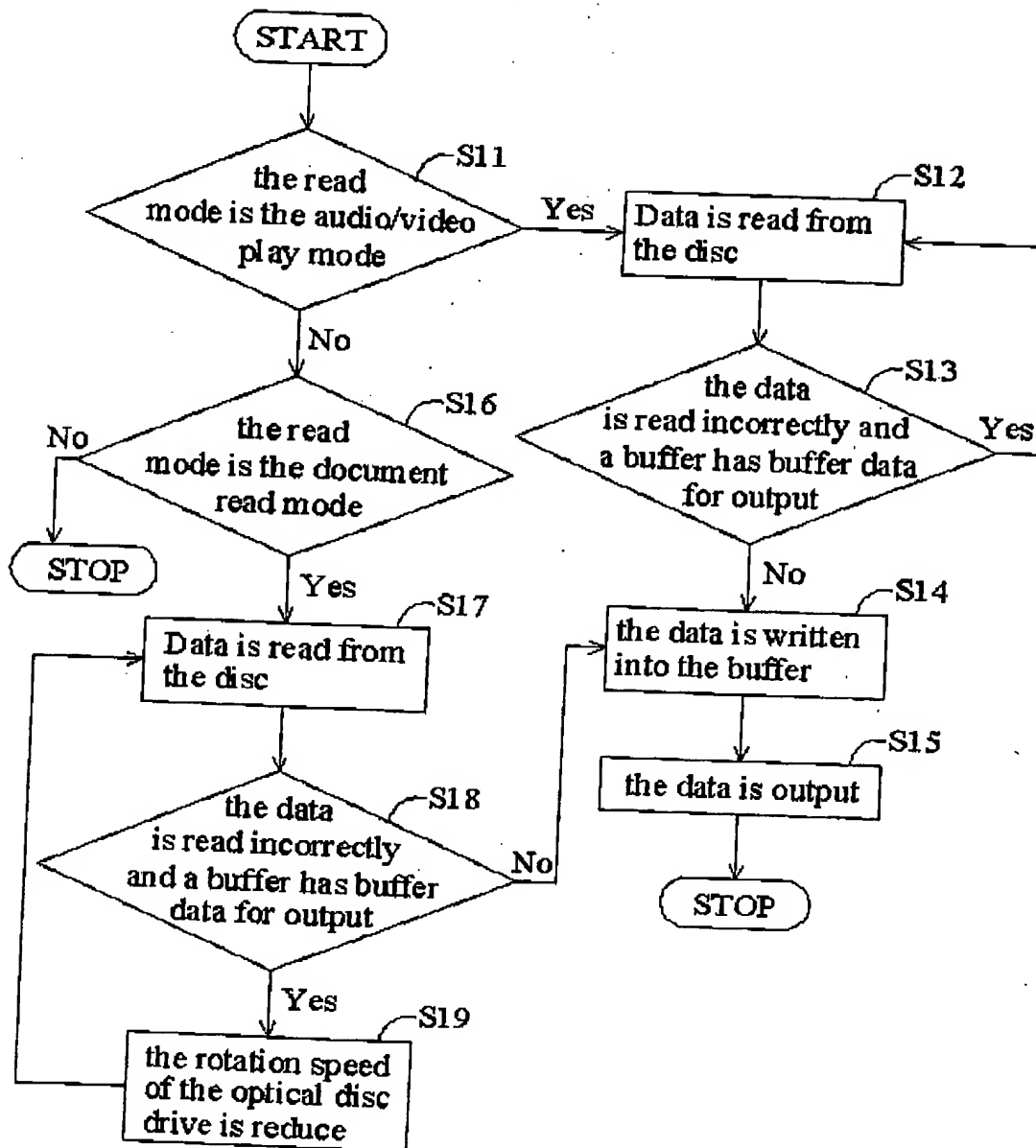
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FIG. 3

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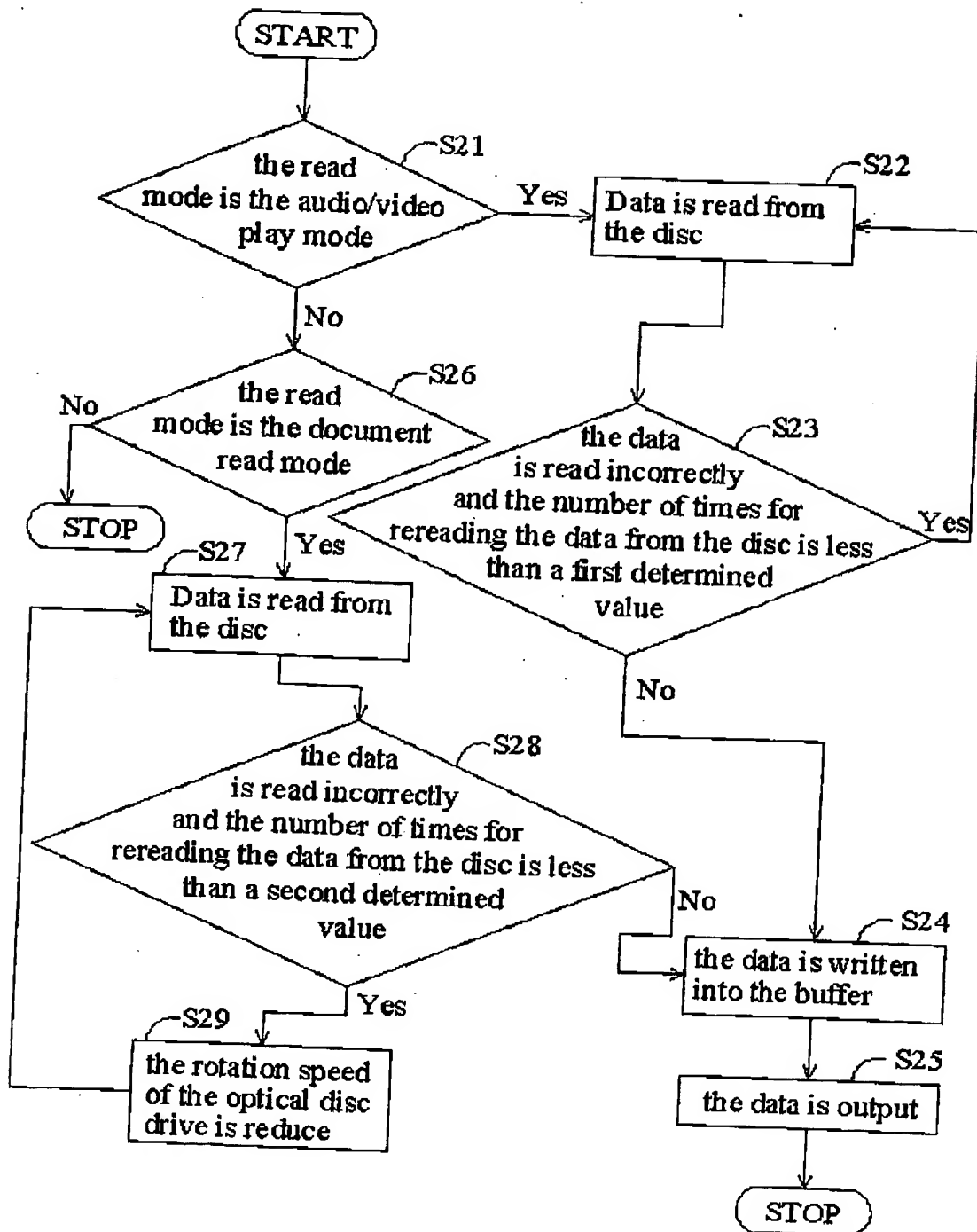
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FIG. 4